# PARALLEL AND PERPENDICULAR PLANES

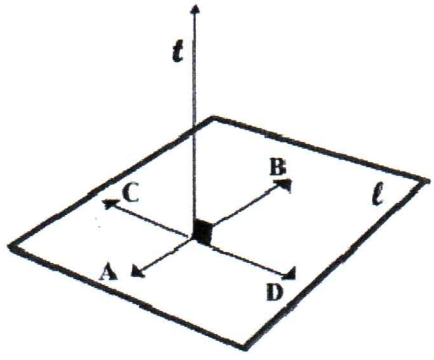
Homework - Parallel and Perpendicular Planes Worksheet

## NOTES

| | |
|---|---|
| **Collinear Points** | **points that lie on the same line.** |
| **Coplanar points** | **points that lie in the same plane.** |
| **Parallel lines** | **two coplanar lines that do not intersect** |
| **Skew lines** | **two non-coplanar lines that do not intersect.** |

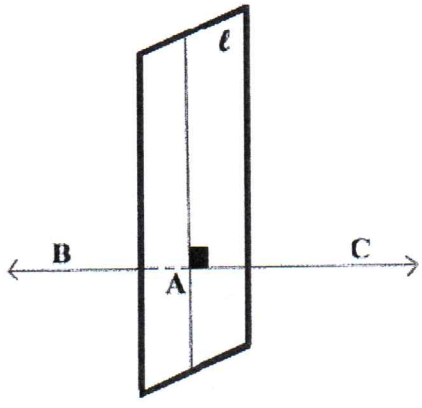
### Theorem 1

If a line is perpendicular to each of two intersecting lines at their point of intersection, then the line is perpendicular to the plane determined by them.



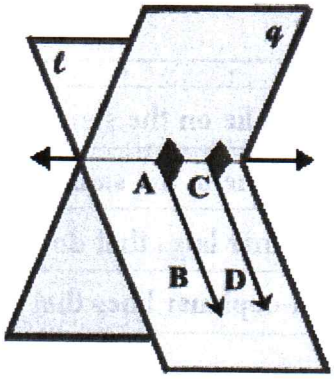

### Theorem 2

Through a given point there passes one and only one plane perpendicular to a given line.



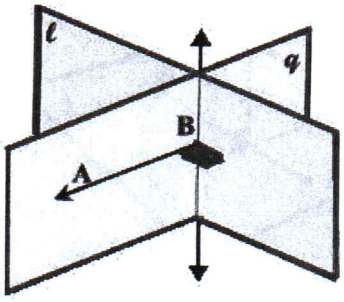
## Theorem 3

Two lines perpendicular to the same plane are coplanar.



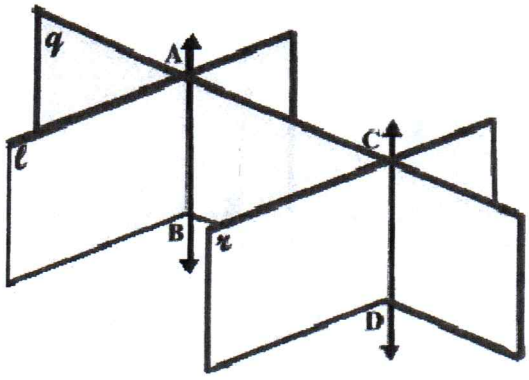

## Theorem 4

If a line is perpendicular to a plane, then every plane containing the line is perpendicular to the given plane.




## Theorem 5

If a plane intersects two parallel planes, then the intersection is two parallel lines.



## EXAMPLE 1

Line $k$ is drawn so that it is perpendicular to two distinct planes, $P$ and $R$. What must be true about planes $P$ and $R$?

(1) Planes $P$ and $R$ are skew.
(2) Planes $P$ and $R$ are parallel.
(3) Planes $P$ and $R$ are perpendicular.
(4) Plane $P$ intersects plane $R$ but is not perpendicular to plane $R$.

## EXAMPLE 2

Point $P$ is on line $m$. What is the total number of planes that are perpendicular to line $m$ and pass through point $P$?

(1) 1 (3) 0
(2) 2 (4) infinite

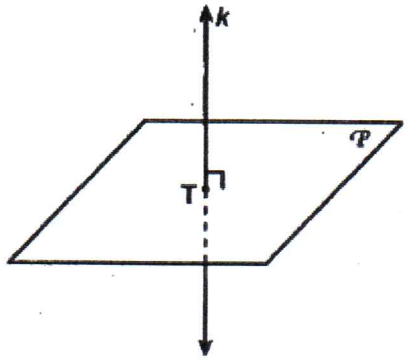
## EXAMPLE 3

In three-dimensional space, two planes are parallel and a third plane intersects both of the parallel planes. The intersection of the planes is a

(1) plane (3) pair of parallel lines
(2) point (4) pair of intersecting lines

## EXAMPLE 4

In the diagram below, line $k$ is perpendicular to plane $P$ at point $T$.




Which statement is true?

(1) Any point in plane $P$ also will be on line $k$.
(2) Only one line in plane $P$ will intersect line $k$.
(3) All planes that intersect plane $P$ will pass through $T$.
(4) Any plane containing line $k$ is perpendicular to plane $P$.